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## Article

# The Relationship between E-Commerce and Firm Performance: The Mediating Role of Internet Sales Channels

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**Abstract:** This paper postulates that the effect of e-commerce on firm performance is not direct and needs to be examined using mediating factors. The Ordinary Least-Squares (OLS) model was employed with the data of the Flash Eurobarometer 439 Survey entitled The Use of Online Marketplaces and Search Engines by small and medium enterprises. The obtained findings provide support for the mediating hypothesis. To be more precise, while the relationship between e-commerce and firm performance is negative, it is positively mediated by certain types of internet sales channels. In particular, the benefits of e-commerce in terms of higher sales are more pronounced when firms use commercial websites and online marketplaces. On the other hand, the interaction between e-commerce and search engines has an insignificant effect on firm performance. This study advances research on e-commerce by emphasizing the importance of mediating effect.

**Keywords:** e-commerce; firm performance; online marketplaces; commercial website; search engine; mediating approach

## 1. Introduction

Nowadays, we live in an era of technical revolution or digital transformation that causes the progress of the mind of those who are part of it. Considering that customers are increasingly “digitalizing,” firms subsequently transform and expand their technical capabilities so as to be innovative and to prepare their business for the digital age, all in order to win over as many customers as possible.

Electronic commerce, widely known as e-commerce, provides many new ways for the business sector and users to communicate, collaborate and to buy and sell products or services. By means of various internet sales channels (websites, online marketplaces, search engines, etc.), e-commerce permits market actors to compare, choose and safely purchase products and services. Firms typically start their web presentation by providing information about their business and their consumer-oriented products/services in support of other sales channels. The importance of e-commerce in today’s business is supported by the fact provided by Eurostat stating, that in 2018, e-commerce represented 18% of the total sales in the European Union (EU) countries [1]. In addition, it was found that one out of five firms in the EU used e-commerce in 2017, while the percentage of firms that employed e-sales increased by 7% during the period from 2008 to 2018 [1]. What is more, the current situation associated to COVID-19

has shown that e-commerce can be an important tool for the overall economy [2]. Actually, according to the World Trade Organization (WTO) (2020), the situation induced due to COVID-19 has resulted in an increase in Business-to-Business (B2B) e-commerce. In the same report, it is underlined that the global nature of COVID-19 and its impact on e-commerce will further encourage international cooperation and development of policies related to e-commerce.

Much research has examined the issue concerning the representation of firms in e-commerce, but also the influence that e-commerce has on overall firm performance. Actually, e-commerce benefits are numerous, for the users, the firms and society in general. As explained in [3], e-commerce offers opportunities for traditional retailers to expand their market share while improving the efficiency of their operations. Firms that use online sales channel have better overall performance and higher sales in comparison with firms with no online sales [4]. According to Intel Corporation, firms that invest in e-business generate the six following benefits: better information management, better integration of suppliers, better channel partnership, lower transaction costs, better market understanding and expanded geographical coverage [5]. In the same sense, research [6], based on secondary data, collected from published books, journals, research papers, magazines, daily newspapers, internet and official statistical documents, is created with the aim of identifying the benefits of e-commerce and challenges in e-commerce. It is shown that benefits for consumers who use e-commerce are various, such as a large array of products and services, the possibility of 24-h-a-day purchase from any location, cheaper products and services, time savings and information availability [6]. It is considered that firms that do not adopt e-commerce technology will be left behind. The benefits of e-commerce for society are reflected in the following: less traffic on the roads and lower air pollution, many individuals work at home and do less traveling for shopping, providing access to people in rural areas to a variety of products and services, facilitating delivery of public services at a reduced cost [7].

On the other hand, different literature sources such as [8–14] identified some of the barriers in terms of e-commerce utilization such as: reliability, trust and risk, lack of qualified staff, culture, lack of public key infrastructure, organization, fraud, old internet navigation and legal problems. In general, the main barrier is considered to be related to education and trust.

Related to the previous discussion, the literature provides mixed results regarding the effect of e-commerce on firm performance. Given the inconclusive findings in prior research, the question concerning the effect of e-commerce on firm performance requires further investigations. To resolve this ambiguity in the literature, this study relies on the mediating approach. As explained in [15], mediation occurs when the causal effect of an independent variable (X) is transmitted onto a dependent variable (Y) by a mediator (M). In this sense, we want to go beyond the direct effect analysis and understand how e-commerce influences firm performance. Accordingly, we believe that the effect of e-commerce on firm performance is not direct, but rather dependent on internet sales channels. As to our knowledge, previous scholars have mainly neglected the mediating factors that could explain inconclusive findings related to the relationship between e-commerce and firm performance. In some exceptions, as indicated in [16], the mediating model better explains the benefits of e-commerce than the direct-effects model. Actually, the mediating approach will help us to include different aspects of business in order to evaluate effect on firm performance. In this context, it is also argued in [3] that, since firms use the internet differently, it is important to analyse whether the different types of online channels have a different impact on firm performance. Therefore, our ultimate goal in this paper, as specified earlier, was not to analyse the direct link between e-commerce and firm performance but to understand if this relationship is mediated by the type of internet sales channel. The rationale for choosing internet sales channels as mediating factors is based on the fact that consumers now have the possibility to choose between different internet sales channels. Therefore, it is necessary for firms to understand the benefits of various channels by which a firm can interact with its customers in order to establish appropriate customer strategies [17]. Moreover, internet sales channels are closely related to various customer segments. Additional support could be found in analysis [18], which found, based on a dataset of 624 firms across 10 countries in the retail industry, that the extent of e-business use and

e-business capabilities contribute to value creation of e-business. Accordingly, we implemented the Ordinary Least-Squares (OLS) model using data on more than 800 EU small and medium enterprises (SMEs), which helped us to better understand the importance of e-commerce for firm performance. More precisely, our theoretical framework and empirical findings contribute to better understanding the relationships between e-commerce and firm performance, highlighting the mediating role that internet sales channels play in this relationship. In other words, by employing the mediating approach when analyzing the e-commerce firm performance relationship, our study offers extensions to theory related to e-commerce since it presents a much-grained analysis, acknowledging that the effect of e-commerce on firm performance may occur through different means—mediators. In this light, our main research question could be formulated as follows: whether the effect of e-commerce on firm performance is mediated by internet sales channels.

In the following sections, we will establish the hypotheses based on the previous literature review. Section 3 focuses on the sample, variables and empirical methodology used. Section 4 provides results, while Section 5 provides discussion on the results. Finally, we will conclude by summarizing the main findings and providing implications of our study as well as future research directions.

## 2. Literature Review and Hypotheses

One of the most utilized theories for explaining the relationship between e-commerce and firm performance is related to the resource-based view (RBV) of the firm [3,19,20]. More precisely, the scholars discuss that complementarities between IT investments could be reflected positively on firm performance.

Recently, several benefits that firms can generate from e-commerce are listed in [21]. Actually, the authors argued that e-commerce provides firms with a channel to better promote and distribute their products while offering new ways to gauge customer preferences. What is more, they argued that e-commerce helps firms to increase product differentiation and soften price competition. In this same light, literature confirms that implementing e-commerce has a positive impact on firm performance [18,22–29]. The study [25], basing on a sample of 217 hotels, confirmed, employing multiple regression analysis, that e-commerce business network and e-commerce competency significantly influence organizational performance. This is in line with research [30] based on a sample of 257 hotels where authors demonstrated, using regression analysis, that hotel performance is enhanced due to e-commerce adoption. In [31], the authors analysed casual relationships between internet technology with e-commerce orientations and organizations' performance. Research, based on a sample of 394 firms, indicates that a firm's e-commerce experiences are positively related to a firm's organizational performance [31]. Research [18] based on a dataset of 624 firms across 10 countries shows that higher degrees of e-commerce utilization are associated with improved business performance. This is in line with research [27,28], where it is demonstrated that e-commerce positively affects the performance of tourism organizations. In [29], a positive relationship was also confirmed between the scope of e-commerce use and firm performance basing on data from 181 Tanzanian tourism firms. The study [23], based on survey data from 243 Malaysian firms, shows that technology resources are the key drivers of e-commerce and lead to better business performance. This is in line with results in [24], where it is shown, based on 48 respondents of supermarkets, that e-commerce adoption has a significant impact on service operations and profit levels. A study [22] reported a significantly higher value of the operational excellence measure for those firms reporting an increase in the financial performance indicator in every case.

In addition, e-commerce helps to improve marketing processes, assists in improving a firm's payment system, and helps to increase workers' efficiency and firm profit [32]. The results of the study also indicate that e-commerce applications have a significant and positive impact on organizational, operational and market-based performance in SMEs. However, the authors found that the e-commerce applications do not have a positive impact on financial performance in small and medium firms. In addition, analysis based on ten types of firms and 410 interviewees has shown that, if customers

trust the brand, the firm will enhance its performance through e-commerce; if they do not, however, the firm will not enhance its performance [33]. In [34], authors made a comprehensive analysis of 836 firms and found that, in large ICT firms in Belgium, there is a strong positive impact of e-commerce on firm performance, while in small firms, e-commerce has no effect on total factor productivity. In the same sense, in [35], authors presented a study where the pure signaling of e-commerce intentions led to significant positive cumulative abnormal returns to shareholders. Furthermore, in [36], an examination was performed on the relationship between electronic commerce competence, customer value and firm performance. This study proved that e-commerce enables firms to recognize the areas that have the best potential to generate customer value and enhance performance, but also to attract new customers. In the same vein, in [37], based on a sample of 288 Spanish firms, the authors found that there is a positive relationship between e-business and firm performance and that the e-business is not related to business size. In [38], an analysis was done on how firm resources can impact e-business performance, and the results have shown that e-commerce technology resources can have a significant impact on a firm's performance. An empirical research about e-commerce performance of corporations in China has been presented, and results have shown that e-commerce application has a positive effect on income increase [39]. Similarly, in [40], authors conducted a research in five EU countries (the United Kingdom, Germany, France, the Netherlands and Italy) with the aim of defining the impact of internet advertising on e-commerce in the EU. The research was done using information collected between 2001 and 2010, and it showed that investment in online advertisement generates better sales. Moreover, in [38], an empirical study shows that IT investments are the key factor for firm success, and that firm competitive advantage mainly depends on whether the firm uses internet technology effectively. In [26], authors did a study on e-commerce activities and their influence on the increase in labour productivity in 14 European countries. Database for the period between 2002 and 2010 was used, and it revealed that there is a significant positive influence of e-commerce on the increase in sales and labour productivity of the considered firms. It was furthermore proved that e-commerce is more beneficial to the service industry than to the manufacturing industry, and that smaller firms are the ones to benefit the most from the e-commerce investment. The research on the influence that web-based e-commerce of small and medium firms in Sweden has on firm performance has shown that there are benefits of e-business implementation in both operational and performance areas of firms [41]. The research shows a positive overall impact of e-business on these firms, and that investing in e-business technology has been beneficial to both manufacturing and service firms. In [42], authors investigated how e-commerce creates value for firms. Their theoretical model, based on survey data collected from firms that have been using e-commerce for an average of 4 years, was proposed and tested using structural equation modelling techniques. They found more than 25% of sales or procurement via internet sales channels.

However, some scholars indicate that e-commerce does not always have a positive impact on different firm performance indicators. Several empirical papers confirm a nonpositive relationship. For instance, research [43] was performed on a sample of 2168 manufacturing firms in Spain, and results obtained by regression analysis suggest that the e-commerce process has a positive impact on firm efficiency, but it becomes nonsignificant in the case of e-selling. E-business has no effect on total productivity factor in small firms [34], as it is previously discussed. It is shown in [44] that "financing ability has a strong negative relation with e-commerce firm revenue." The fact is that massive capital inputs are used as extended reproduction results in the financing ability increases and e-commerce firm revenue decreases. The results in [44] identify the paradox of massive inputs and low returns to inputs in e-commerce.

In an empirical study [45], based on a sample of 38 service-sector firms, it was found that there is no correlation between IT and return on investment. Similarly, in [46], based on a sample of 58 banks, the author found that there is no relationship between organizational performance and the relative proportion of resources allocated to IT. In [32], based on a sample of 120 Indian small and medium firms, it was shown that e-commerce does not have a positive impact on improvement of financial performance of SMEs, while it has a positive impact on operational and market-based performance.

Research [47] was based on data collected via a Web-based survey of 550 retailers. They tested their hypotheses in the context of retailers' online channel development efforts. The evidences obtained imply that there is a significant negative relationship between the presence of a cost-efficiency capability and online commitment. However, further investigation pointed out that the indirect effect, mediated by commitment, is positive. In research [48], based on a sample of 232 announcements of investments in electronic commerce by listed Australian firms over a 13-year period, the authors did not confirm that innovative investments in electronic commerce are associated with positive abnormal returns for the firms making these investment decisions. In [49], authors analysed, using financial and statistical tools, the impact of information technology on the financial performance of Royal Jordanian Airlines. The findings suggest a negative impact of IT investments on financial performance.

In [50], based on 44 sample firms, empirical analysis was carried out and, consequently, it was concluded that 64% of firms believe that e-commerce has a positive impact on return on investment (ROI), 18% believe this impact to be negative, while 18% remain neutral. Based on a sample of more than 100 publicly traded companies, a study [3] examined the impact of online-channel use on retailers' performance. The results show that the online channel provides significant improvements in sales, cost, inventory and return on investments, while the timing of online-channel adoption does not play a significant role in performance improvement.

Research discussed in paper [51] evaluated the value of e-business using data collected from IT and e-business managers. The results indicate that the impact of e-business drivers on operational improvements is small. More precisely, results induce that firms achieve some financial improvements from e-business only in the short time.

Considering the contradiction in the previous literature, we established three competing hypotheses:

**Hypotheses 1a.** *E-commerce has a positive effect on firm performance.*

**Hypotheses 1b.** *E-commerce has a negative impact on firm performance.*

**Hypotheses 1c.** *E-commerce has a neutral impact on firm performance.*

In [19], it is stressed that, in order to benefit from e-commerce, the fit between complementary resources is necessary. In this sense, it is not only sufficient to invest in e-commerce. Several scholars underlined that the relationship between e-commerce and firm performance is not direct [16,47], but that rather it depends on additional factors. This is in line with the resource-based view suggesting that the value of IT investment is related to the complex interplay of several resources and capabilities [52]. Accordingly, it is found in [47] that the direct effect of firm information systems' capabilities on online performance is negative, but the indirect effect via online commitment is positive. Similarly, it is found in [53] that various factors such as technology readiness, financial resources and government regulation contribute to the value of e-business.

It is suggested in [17] that the type of sales channels could determine the link between e-commerce and firm performance. In addition, managing various internet sales channels (website, online marketplaces, search engines) is important since those channels are closely related to various customer segments. Therefore, it is expected that internet sales channels mediate the relationship between e-commerce and firm performance. Mediation will help us to identify conditional effects regarding the relationship between e-commerce and firm performance.

Even though empirical and theoretical literature are lacking regarding the mediating role of internet sales channels, we found several rational cases concerning three channels, namely, website, marketplace and research engines, that could support their mediating role.

Actually, when a firm wants to sell a product or a service, it can find the buyers online by advertising its offers by means of a website or online marketplace. An online marketplace is where several firms and brands sell their products and/or services and it is also called an e-marketplace. These online marketplaces may be managed by third parties that arrange the sale for a number of manufacturers.



E-commerce may be oriented to customers or to other firms. The Business-to-Customer model (B2C) represents the sale of products and services and provides information directly to the customer, while B2B refers to online exchange of products, services and information between the firms. Most of these marketplaces serve as hosts or intermediaries between the firms, or between consumers and firms, and therefore enable B2B and B2C trading. Namely, the hosts of such marketplaces provide information about the products and services and carry out the payment. Therefore, it could be concluded that marketplace has an important role in e-commerce success in regards to firm performance.

Regarding popularity of various internet channels, it is found in [54] that, in 2016, 77% of EU businesses had a website, while 26% of EU businesses relied on internet advertising. It is also found that, during 2018, 88% of EU firms with web sales used their own websites or apps, while 40% used an e-commerce marketplace [1].

In [55], an analysis was done on how two antecedents affect firm performance and interact in an e-commerce context. The analysis shows that those firms that conduct effective advertising campaigns are able to attract more web shoppers to their websites. In the event that an increased number of website visitors is accompanied by improved sales experience, it will result in a greater number of visitors becoming the buyers as well. In this way, complementarity between the website and advertising is likely to boost firm performance. In [56], a “chain of effects from website content, through informational and transactional success to overall website success and company performance” was tested. It is found that the informational and the transaction-related website functions have a significant positive impact on website success. The results are based on an empirical study of 380 firms.

By developing website features that meet the needs of consumers’ purchase-related task requirements, some firms offer a superior shopping experience, and the overall value that consumers get from their purchases with such firms is therefore enhanced [55]. In [57], the analysis was conducted using a questionnaire among users of various marketplaces. The findings demonstrate improvement in firm sales due to the increase in the number of marketplaces used. If a firm takes steps to prepare itself for a successful entrance into an e-marketplace, it will be able to gain the available opportunities and thereby bring the anticipated business results [58].

A search engine can be defined as a kind of software which collects data or information about websites [59]. Based on a research study, more than 80% of internet users search for information through the search engine [44]. In the same sense, more than 50% of all visitors to websites tend to get there from a search engine [60]. More than 90% of users report that they always, or most of the time, find the information they are looking for [61]. When we talk about interest in website ranking, it is found that 73% of search engine users never look beyond the first page of returned results [62].

In [44], an empirical analysis about the relationship of search engine marketing, financing ability and firm performance of Chinese e-commerce firms was made. It revealed that “Page view” has a strong positive relation with e-commerce performance, and thus it is necessary to attract customers by search engine marketing. It is considered that search engine marketing has a strong positive relation with e-commerce firm performance, while financing ability has a strong negative relation with e-commerce performance, because inputs cannot be presented immediately due to the time-lag effect.

According to the above discussion, we expect that internet sales channels have an important role when considering the link between e-commerce and firm performance. Therefore, we propose following hypothesis:

**Hypotheses 2.** *Internet sales channels positively mediate the relationship between e-commerce and firm performance.*

Notwithstanding, the firm decision to introduce e-commerce activities is dependent on various firm characteristics [63]. In the same sense, various firm characteristics also influence firm performance. For instance, it is argued that the relationship between firm size and sales could go in both directions. More precisely, a positive link is supported in [64], a negative link is found in [65]. Furthermore, it is considered that older firms have more knowledge, abilities and skills [66,67], which have a

positive impact on firm performance. Some scholars highlighted the importance of controlling the sector differences when examining firm performance [65]. In order to integrate these important considerations, our analysis includes the abovementioned variables that will be discussed more in detail in the next section.

### 3. Data and Econometric Model

Researchers in [68] have shown that the most competitive European countries are leaders regarding the utilization of ICT. Moreover, in [69], it is demonstrated that innovation leaders are the firms that largely invest in ICT. The study also concluded that the gap in development among EU countries will remain the same or even increase if strong action related to the increase of ICT adoption is not undertaken [69]. In line with that is research [70], where it is stressed that the incentives of the innovation activities are different between developed and developing countries, mostly due to firms' characteristics (size) and external strategic features (export and firm performance).

E-commerce is a very important economic sector in Europe, growing at seven times the rate of the rest of the economy [71], so it is very important to investigate the effect of e-commerce. The data used in the study were from the Flash Eurobarometer 439 Survey entitled The Use of Online Marketplaces and Search Engines by SMEs, conducted by the European Commission [71]. The report "The use of online marketplaces and search engines by SMEs" contains comprehensive statistics on overall data. The survey was carried out between 13 April and 22 April 2016 [71]. The data provide information on retail and services of SMEs in 10 Member States. The sample includes firms employing 1 to 250 employees in the retail (NACE category G) and services (NACE categories H, I, J, M, N, R) sectors. As indicated by the data producer, the firms were selected from an international business database, with some additional samples from the local sources in countries. More than 35% of the companies from these 10 countries sell their products/services on the internet, while 62% never do that [71]. In accordance with the same report, companies with more employees are more likely to sell their products/services on the internet. Of note, 88% of companies that sell on the internet use their commercial website to do that, 82% rely on search engines, while 42% of them use online marketplaces to sell their products and services [71]. However, many companies use more than one of these selling online. In the report, it is shown that 64% of companies agreed that information about their customers that they receive through online marketplaces is useful for development or improvement of their products/services; 66% of companies that sell online agree that their position in search results has a significant impact on their sales [71]. After deleting the missing observations needed for this analysis, we worked on the sample of 863 firms. The sample includes information on ten EU countries: France (N = 117), the Netherlands (N = 168), Germany (N = 62), Denmark (N = 56), Ireland (N = 97), the United Kingdom (N = 50), Spain (N = 75), Sweden (N = 117), Estonia (N = 21) and Poland (N = 100). The choice of the countries was made by the data producer.

#### 3.1. Dependent, Independent and Control Variables

Previous scholars [72–74] have considered sales as the most important performance measure due to the fact that sales influence firm financial performance. In addition, authors in [72,75] noted two advantages using sales as a measure of firm performance: it gives the possibility to compare sales between firms using a single index; and it gives direct value of returns on investments. Therefore, in order to measure firm performance, we use the variable denoted as *SALES* that corresponds to the logarithm of sales. More precisely, the firms were asked to indicate total annual sales in euros for 2015.

*E-COMMERCE* is operationalized using information on how often a firm sells products and/or services on the internet ranging from 1 (never) to 5 (always). We used three internet sales channels. Firstly, *COMMERCIAL WEBSITE* is a variable ranging from 1 (never) to 5 (always) in terms of whether a firm uses commercial websites to sell products/services. Secondly, *ONLINE MARKETPLACES* has values from 1 (never) to 5 (always) in terms of whether a firm uses online marketplaces, where several firms and brands sell their products and/or services. Thirdly, *SEARCH ENGINE* is also a count of data



with values from 1 (never) to 5 (always) in terms of whether a firm relies on search engines to sell products/services.

Additionally, as discussed previously, we introduce three control variables that could have an impact on firm performance measured by sale, namely, *SIZE*, which is a continuous variable, *YEAR OF ESTABLISHMENT*, as well as the sector of the activity.

Finally, in order to examine if the relationship between internet sales and firm performance depends also on the internet sales channels, we created three additional variables. Variables *INTERACTION 1*, *INTERACTION 2* and *INTERACTION 3* are created by forming interaction between variables *E-COMMERCE* and *COMMERCIAL WEBSITE* or *ONLINE MARKETPLACES* or *SEARCH ENGINE*, respectively.

The variables used in estimation and some descriptive statistics are provided in Table 1. No problem of multicollinearity has been detected.

The research included a total of 9 variables, as shown in Table 1, whereby:

**Sales**—it is a continuous variable that represents the volume of realised sales defined as a logarithm of sales.

**E-commerce**—is a variable that represents a sales level that a firm has realised via different internet sales channels.

**Size**—the size of a firm, in terms of the number of employees, is a continuous variable.

**Year of establishment**—encompasses 3 groups of firms: firms established in 2015 and beyond, firms established in 2010, 2011, 2012, 2013 and 2014 and firms established before 2010.

**Service**—is a sector of the activity of a firm.

**Retail**—this variable, categorised as a dummy variable, is also used to define a sector of the activity of a firm.

**Commercial website**—is a variable that describes how often a particular organisation uses website to sell its products.

**Online marketplaces**—is a variable that describes how often a particular organisation uses online marketplaces to sell its products.

**Search engine**—is a variable that describes how often a particular organisation uses online search engine to sell its products.

Frequency distribution diagrams of rank variables are shown in Figure 1.

### 3.2. Econometric Model

Given that our dependent variable is a continuous one, the relationship between the variables *E-COMMERCE* and *SALE* is tested using an Ordinary Least-Squares (OLS) regression. As indicated in [76–78], OLS regression is one of the most used statistical techniques in the social sciences. Ordinary Least-Squares regression is a statistical method which analyses the relationship between one or more independent variables and a dependent variable [79]. Using OLS regression, multiple variables can be analysed simultaneously in order to answer complex research hypotheses. The authors in [76–78] further explained that OLS is performed to predict values when a dependent variable is a continuous one, using one or more explanatory variables.

The model can be written as:

$$\ln(y)_i = X_i a + e_i$$

where  $\ln(y)_i$ ,  $X_i$ ,  $a$ , and  $e_i$  represent *SALE*, the vector of exogenous variables, estimated coefficients, and error term, respectively.

The model is tested using STATA statistical software.

**Table 1.** Definition of variables and descriptive statistics (N = 863).

Variables	Definition	Mean	SD	Min	Max
Sales	Logarithm of SALES (Continuous variable)	13.70	2.20	0.00	18.36
E-commerce	The firm sales of products/services on the internet (1) Never (2) Rarely (3) Sometimes (4) Most of the time (5) Always (Rank variable)	3.15	1.10	2.00	5.00
Size	Number of employees (Continuous variable)	19.43	33.36	1.00	249.00
Year of establishment	The firm was established (3) Before 1 January 2010 (2) Between 1 January 2010 and 1 January 2015 (1) After 1 January 2015 (Rank variable)	1.17	0.41	1.00	3.00
Service	The main activity of the firm is service Dummy variable (= 1 if yes)	0.63	0.48	0.00	1.00
Retail	The main activity of the firm is retail Dummy variable (= 1 if yes)	0.37	0.48	0.00	1.00
Commercial website	The firm uses commercial websites to sell products/services (1) Never (2) Rarely (3) Sometimes (4) Most of the time (5) Always (Rank variable)	3.65	1.36	1.00	5.00
Online marketplaces	The firm uses online marketplaces, where several firms and brands sell their products and/or services (1) Never (2) Rarely (3) Sometimes (4) Most of the time (5) Always (Rank variable)	2.00	1.31	1.00	5.00
Search engine	The firm relies on search engines to sell products/services (1) Never (2) Rarely (3) Sometimes (4) Most of the time (5) Always (Rank variable)	3.18	1.39	1.00	5.00

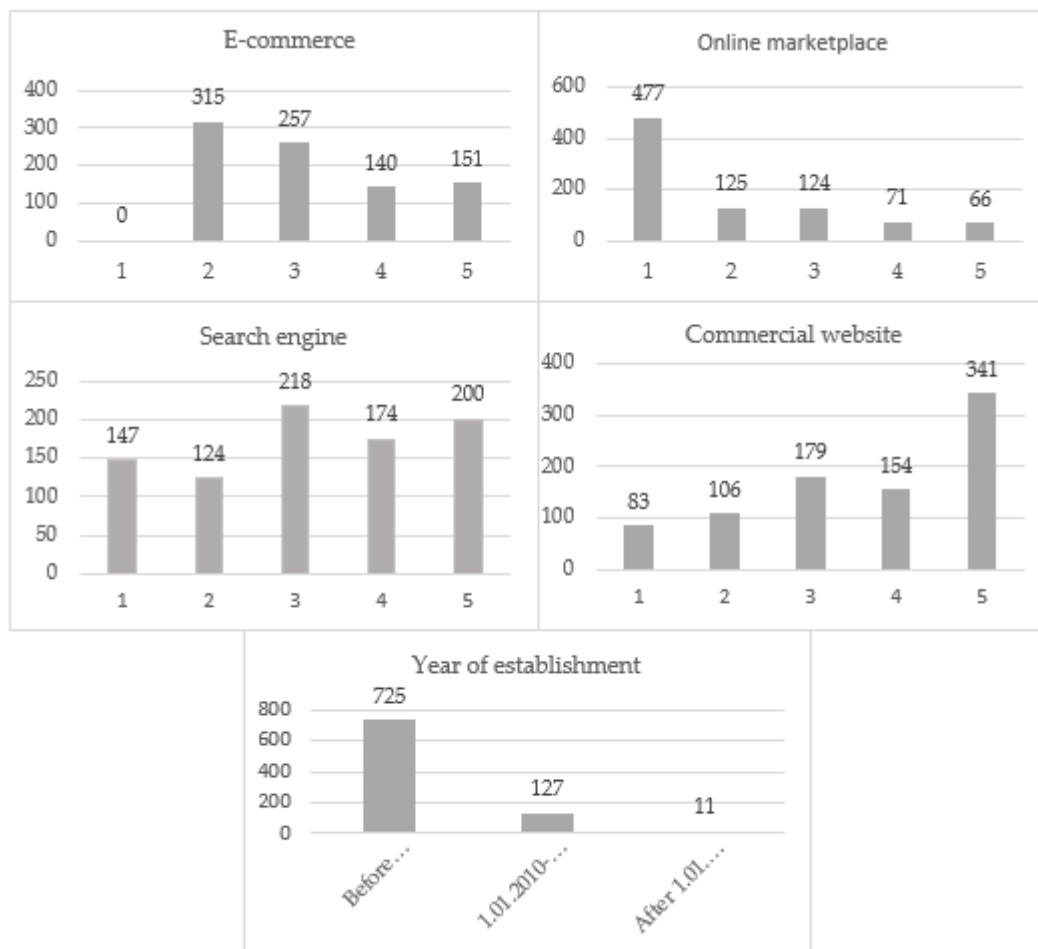


Figure 1. Frequency distribution diagrams of rank variables.

#### 4. Results

In [78], it is explained that  $R^2$  provides descriptive information about the model fit. It is calculated using the following equation:

$$R^2 = \frac{\sum (\hat{y} - \bar{y})^2}{\sum (y - \bar{y})^2}$$

where  $y$  is the observed value of  $y$ ,

$\hat{y}$  is the value of  $y$  predicted from the model and  $\bar{y}$  is the mean value of  $y$ .

The  $R^2$  is 0.28 and 0.27 for the direct and mediating effects, respectively.

Therefore, we are in a position to test the validity of the proposed hypothesis on the basis of the statistical significance of their associated parameters. The level of significance is defined as follows: \*\*\*  $p < 0.01$ ; \*\*  $p < 0.05$ ; \*  $p < 0.1$ .

Table 2 presents the OLS analysis results. As we can see, e-commerce is negatively related to firm performance ( $\alpha = -0.11$ ,  $p < 0.001$ ). Thus, hypothesis H1b is supported while hypotheses H1a and H1c are rejected. Therefore, the results obtained in reference to the relevance of e-commerce on firm performance do not coincide with those found in the previous literature [18,23–29], but it supports the scholars arguing that e-commerce does not boost firm performance in particular indicators of firm performance [32,34,43]. Moreover, the obtained findings are in line with previously elaborated literature underlying that the link between e-commerce and firm performance is not direct and requires further investigation [16,47].

**Table 2.** Ordinary Least-Squares (OLS) estimates of the relationship between internet sales and SALES—direct and mediating effect.

Variables	Direct Effect			Mediating Effect		
	Coefficients & Significance	Standard Errors	t-Value	Coefficients & Significance	Standard Errors	t-Value
Intercept	11.55 ***	0.50	23.03	11.54 ***	0.50	23.03
E-commerce	−0.11 *	0.06	−1.70	−0.23 *	0.12	−1.93
Commercial website	0.14 ***	0.05	2.64	-	-	-
Online market	0.12 ***	0.05	2.27	-	-	-
Search engine	−0.08	0.05	−1.56	-	-	-
Interaction 1	-	-	-	0.04 ***	0.02	2.18
Interaction 2	-	-	-	0.03 ***	0.01	2.15
Interaction 3	-	-	-	−0.02	0.01	−1.46
Size	0.03 ***	0.00	14.34	0.03 ***	0.00	14.30
Year of establishment	0.86 ***	0.16	5.51	0.86 ***	0.16	5.48
Service	−0.80 ***	0.13	−6.02	−0.80 ***	0.13	−6.00
Observations		863			863	
R-squared		0.28			0.27	

\*\*\*  $p < 0.01$ ; \*  $p < 0.1$ .

In regards to the control variables, it can be concluded, as expected, that two control variables, size and year of establishment, have a positive and significant impact on firm performance, while being part of the service sector (comparing to the retail) has a negative impact on firm performance. Next, we examined the mediating effect of internet sales channels on the relationship between e-commerce and firm performance. Table 2 also includes the interactions effects' findings. As we can see, if the firm uses commercial sites to sell on the internet, it significantly and positively influences firm performance measured by sales ( $\alpha = 0.04$ ,  $p < 0.001$ ). Furthermore, the findings also indicate that online marketplaces could be considered as a positive mediator, since the *INTERACTION 2* also has a positive and significant impact on firm performance ( $\alpha = 0.03$ ,  $p < 0.001$ ). Finally, results concerning the interaction effect between research engine and e-commerce on firm performance show that this relationship is not a significant one.

Therefore, we may conclude that hypothesis H2 is partly supported. Actually, the type of internet sales channels does matter when examining the relationship between e-commerce and firm performance. In general, the findings support results from previous literature concerning the importance of the internet sales channels [17,44,55,56]. More importantly, the findings reveal that the relationship between e-commerce and firm performance is not direct since it depends on additional factors that determine this relationship [16,47]. Furthermore, the findings reveal the conditions under which e-commerce can generate benefits for firm performance measured by sales. Accordingly, by proposing the mediating approach, we offer a more detailed insight in the e-commerce-firm performance link. Overall, the choice of internet sales channel affects the way in which e-commerce influences firm performance.

## 5. Discussion

### 5.1. Theoretical Advancements

This paper makes three distinctive advances. First, past research has shown contradictory results regarding the impact of e-commerce on firm performance. More precisely, while one group of authors demonstrates a positive effect of e-commerce on firm performance, e.g., [23,24], the other group suggests that this relationship is negative or neutral, e.g., [32,34]. However, those studies only examine

the direct link, ignoring that this link could be contingent on various factors that are associated to firm strategy.

Accordingly, several researchers [16,47] pointed out that the effect of e-commerce may be dependent of various features. Therefore, we posit that one of the reasons for ambiguity in previous literature regarding the relationship between e-commerce and firm performance could be traced to the fact that e-commerce could not be examined in isolation. In other words, most previous scholars proposed a direct link between e-commerce and firm performance. In order to go deeper, we proposed an indirect link, assuming that the effect of e-commerce on firm performance depends on internet sales channels. In doing so, we identified the channels through which e-commerce boost firm performance. Consequently, our study shows the importance of mediating factors and underlines the complexity of the relationship between e-commerce and firm performance. Comparing to previous analyses that identified that specialized e-commerce investments [16] or commitment [47] play a mediating role, the present findings suggest that e-commerce may be effective particularly when firms use the appropriate channel. This is a very important finding since it can guide firms to choose not only an appropriate sales channel, but also a strategy that will support e-commerce. Second, as previous literature [34] found that e-commerce has only a positive impact on larger firm performance, measured with total factor productivity, and not on small and medium firms, by focusing on SMEs, our study contributes to the previous literature by demonstrating that SMEs could also benefit from e-commerce investment. What is more, we recognize under what conditions e-commerce can generate benefits to the firm performance. Third, while a majority of previous analyses on the subject, e.g., [32,34], are examining the benefits of e-commerce in one particular country, employing data that contain information about firms from 10 countries further confirms the generality and robustness of our findings. This is in line with [80], who stressed that using the data which include firms from different countries helps in further enhancing the generalizability of the findings. Therefore, we may conclude that the findings are quite general, as we consider firms from various economic and institutional contexts.

## 5.2. Managerial Implication

Our findings further provide several insights that contribute to the e-commerce literature and to practicing managers. Firstly, the study contributes to e-commerce literature by showing that the relationship between e-commerce and firm performance is not direct. Therefore, managers should be aware of the limitations of e-commerce and not ignore mediating factors. Actually, the investment in e-commerce should largely be determined by the type of channel used. Secondly, following our findings, they should identify the conditions under which e-commerce can improve firm performance. Actually, the research confirms that successful e-commerce investment requires detailed analysis in regards to complementary investments and customer-orientated strategies. Therefore, one way for managers to profit from e-commerce implementation is to choose appropriate internet sales channels that fit mostly firm business environment. Thirdly, managers should be aware of the conditional nature of the effect of e-commerce on performance to avoid possible negative effects. Not understanding the conditional nature can lead managers to invest in activities that can harm firm performance. This further suggests that SME managers can, in advance, avoid the negative effect of e-commerce by considering internet sales channels that correspond to their customer-oriented business strategy. Fourthly, the findings could also help managers to define the customer segments, since segments identified through channels are valuable for firm business [81]. Accordingly, managers should segment their consumers into appropriate groups, and based on this segmentation, they should choose appropriate internet sales channels.

## 6. Conclusions

This paper has been inspired by the increasing popularity of e-commerce. E-commerce is considered to be one of the most significant scientific achievements in the 20th century, since its effects go far beyond businesses; it impacts society as a whole [29]. However, despite the significant attention



that the relationship between e-commerce and firm performance has received in the previous literature, obtained findings are mixed and equivocal [18,27–29,32,34,43,51]. Given the inconclusive findings, the question whether e-commerce improves firm performance remains open.

In order to understand this paradox, some researchers suggest that different firms' features may have been associated differently with e-commerce. Actually, the authors argued that investing in only IT-related technologies does not guarantee improvement of firm performance. In addition, authors in [16] proposed a model where specialized e-commerce investments act as mediators between e-commerce and firm performance. Moreover, the authors concluded that the mediating approach better explains the value of e-commerce than a direct-effects model. Therefore, we believe that the inconsistency in explaining the effect of e-commerce on the firm performance rests with the mediating factors that further define e-commerce functioning.

Accordingly, to fill these research gaps, we examined the mediating role of three types of internet sales channels (website, online marketplaces and search engine) in the relationship between e-commerce and firm performance. Actually, different internet channels are considered to impact firm performance differently, since they are closely related to various customer segments. Based on 863 SMEs from 10 European countries when looking only at the direct effect, we can confirm, in a sense, that e-commerce has a negative effect on firm performance, which is in line with previous scholars [32,34,43]. However, these results should be interpreted with caution, since further analysis reveals that the effect of e-commerce on firm performance is dependent on the internet sales channels. Actually, additional analysis shows that, when interacting with two types of internet sales channels, namely websites and marketplaces, e-commerce boosts firm performance.

In general, our findings support the mediating approach, contributing to the notion that the relationship between e-commerce and firm performance is not a direct one [16,47]. In this light, our study confirms the view that, to understand the relations between e-commerce and firm performance, we need to rely on the mediating approach.

#### *Limitations*

Our research has a few constraints. Firstly, data contains only information regarding SMEs, thus we cannot generalize our findings. Secondly, the paper is based only on the retail and service sector. Thirdly, the data covers only 10 countries from the EU. Fourthly, we analysed just one mediating factor (internet sales channels).

#### *Future Directions*

In accordance with previous discussion and in order to better generalize our findings, future research should be focused on large as well as on manufacturing firms. It also could be very useful to spread the research out on countries from a less-developed institutional context. Further, future research can analyse some other mediating factors such as business competitiveness, investment in IT equipment, etc.

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